REMARKS/ARGUMENTS

The claims are 11-19. Claim 10 has been canceled in favor of new claim 18 to improve its form and to better define the invention, new claim 19 dependent on claim 18 has been added, and claims 11-13 and 15-16 have been amended to improve their form and to depend on new claim 19. Claim 17 has been amended to improve its form and to specify that the compressor control unit uses the frequency and/or the amplitude of the output signal of the air flow sensor "to detect compressor creaking or compressor pumping...." These claims and claim 14 have also been amended to delete reference numerals. In addition, the Abstract has been replaced with a new Abstract to improve its form and the specification has been amended to add headings as requested by the Examiner. Support for the claims may be found, *inter alia*, in the disclosure at pages 4 and 9-11. Reconsideration is expressly requested.

The Abstract was objected to as failing to conform with U.S. practice for the reasons set forth on page 2 of the Office Action. In response, Applicants have replaced the Abstract with

a new Abstract, which it is respectfully submitted overcomes the Examiner's objection to the Abstract.

The specification was objected to as lacking headings, and in response, Applicants have amended the specification to supply headings, which it is respectfully submitted overcomes the Examiner's objection to the specification on the basis of this informality.

Claims 11-12 and 17 were objected to because of certain informalities set forth on page 3 of the Office Action, and claims 10-13 and 16 were rejected under 35 U.S.C. 112, second paragraph, for the reasons set forth on pages 4-5 of the Office Action. In response, Applicants have canceled claim 10 in favor of new claim 18, have added new claim 19, and have amended claims 11-17 to improve their form. It is respectfully submitted that all currently pending claims fully comply with 35 U.S.C. 112, second paragraph, and Applicants respectfully request that the rejection on the basis of these formal grounds likewise be withdrawn.

Claim 11 was rejected under 35 U.S.C. 112, first paragraph, because in the Examiner's view the specification while being enabling for "a first limiting amplitude and a second limiting amplitude" does not reasonably provide enablement for "intervention being carried out differently than when a second limiting amplitude which is greater than the first limiting amplitude is exceeded."

This rejection is respectfully traversed.

Under 35 U.S.C. 112, the detailed description of the invention need only be in such full, clear, concise, and exact term as to enable any person skilled in the art to which it pertains or with which it is mostly connected to make and use the same. It is respectfully submitted that one skilled in the art upon reading the specification would understand how to carry out different interventions depending on different limiting values, as recited in claim 11 as amended.

The specification at page 4, first full paragraph states "that the output signal of the air flow sensor exhibits a characteristic oscillation behavior as soon as instabilities occur in the flow through the compressor." Oscillations are usually described by frequency and amplitude, and accordingly page 4, first full paragraph of the specification further states that "the frequency and/or amplitude of the output signal are monitored....".

In the paragraph bridging pages 9-10, the specification states that "the output signal of the air flow sensor 4 correlates to the flow behavior of the air flow in the compressor 5 at least to such an extent that it can be used to detect whether or not compressor creaking and/or compressor pumping are present." This statement is further explained in that paragraph as follows: "While the HFM signal [i.e. the output signal of the air flow sensor] exhibits as it were a continuous profile when the flow through the compressor 5 is stable, an oscillating signal, which can be characterized by frequency and amplitude, is produced when compressor creaking occurs. At the transition to

compressor pumping, in particular the amplitude of the oscillating output signal rises significantly."

It is respectfully submitted that the above passages clearly state the dependencies of frequency and amplitude on the one hand and compressor creaking and pumping on the other hand. As stated above, compressor creaking can be detected when the output signals of the air flow sensor shows a defined frequency together with a relatively low amplitude, while compressor pumping can be detected when the output signal shows a frequency and relatively high amplitude. The amplitude in case of pumping is at least significantly higher than in the case of creaking because creaking does not disturb the function of the compressor but has some disturbing sound emissions, adequate interventions to react to creaking are different from adequate interventions to react to pumping because pumping is very dangerous for the proper functioning of the compressor. Adequate or suitable interventions in both cases may for example differ in the degree in the respective intervention. A main difference between the interventions assigned to creaking and such assigned to pumping

is the impact in the respective intervention on the charging pressure of the compressor. While an intervention assigned to pumping needs a reduction of the charging pressure to stablize the air flow, an intervention assigned to creaking does not have to reduce the charging pressure because the air flow is still stable in the case of creaking.

It is respectfully submitted that one skilled in the art would derive sufficient guidance for conducting different interventions, particularly in view of the paragraph bridging pages 10-11 of the disclosure wherein it is stated: "In one expedient development, the compressor control unit 15 initiates other countermeasures in the case of compressor creaking than in the case of compressor pumping. This embodiment is based on the realization that, in contrast to compressor pumping, no or only a small drop in charging pressure occurs in the case of compressor creaking. Accordingly, in the case of compressor creaking the disruptive generation of noise can be damped selectively by means of suitable countermeasures, as far as possible without reducing the charging pressure P2. In contrast to this, by using the

countermeasures carried out to avoid or reduce compressor pumping the intention is to reduce the charging pressure P2 in order to stablize the flow."

In view of the foregoing, it is respectfully submitted that one skilled in the art upon reading Applicants' specification would know how to practice the process recited in Applicants' claim 11 as amended. Accordingly, it is respectfully submitted that the rejection under 35 U.S.C. 112, first paragraph, be withdrawn.

Claims 10 and 17 were rejected under 35 U.S.C. 102(b) as being anticipated by *Danno et al. U.S. Patent No. 4,705,001*. Claims 12-14 and 16 were rejected under 35 U.S.C. 103(a) as being unpatentable over *Danno et al.* in view of *Engel et al. U.S. Patent No. 6,253,748*. Claims 12-16 were rejected under 35 U.S.C. as being unpatentable over *Danno et al.* in view of *Fausten et al. U.S. Patent No. 6,308,517*. Essentially the Examiner's position was that *Danno et al.* discloses the method and apparatus recited in the rejected claims except for features which were said to be

shown by the secondary references to *Engel et al.* and *Fausten et al.*

In response, Applicants have canceled claim 10 in favor or new claim 18 and have amended claim 17 to better define the invention and respectfully traverses the Examiner's rejection for the following reasons.

As set forth in claim 17 as amended, Applicants' invention provides an internal combustion engine having an intake section in which a compressor for generating charging air and an air flow sensor for determining an output signal which correlates to the intake air flow are arranged, an engine control unit which communicates with the air flow sensor and uses the output signal to control and/or regulate the internal combustion engine, and a compressor control unit which regulates and/or controls the compressor as a function of a state variable which describes the behavior of the compressor. The air flow sensor is arranged upstream of the compressor in the intake section, and the compressor control unit communicates with the air flow sensor and

uses the frequency and/or the amplitude of the output signal of the air flow sensor to detect compressor creaking or compressor pumping and to control and/or regulate the compressor accordingly.

As set forth in new claim 18, Applicants' invention provides a method for operating a compressor in an intake section of an internal combustion engine of a motor vehicle in which an air flow sensor arranged in the intake section upstream of the compressor is caused to generate an output signal having a frequency and an amplitude for regulating or controlling the internal combustion engine, at least one of the frequency and the amplitude of the output signal is monitored and is used to detect compressor creaking or compressor pumping, and an intervention is carried out in a regulating or controlling fashion if compressor creaking or compressor pumping is detected.

In this way, Applicants' invention provides a method and a device that avoids compressor pumping for a compressor in an internal combustion engine.

The primary reference to *Danno et al.* fails to disclose or suggest an internal combustion engine or a method for operating a compressor in the intake section of an internal combustion engine as recited in amended claim 17 and new claim 18 respectively, in which at least one of the frequency and the amplitude of the output signal is used to detect compressor creaking or compressor pumping. *Danno et al.* describes in column 3, lines 28-29, the use of an air flow sensor to detect the amount of suction air flowing through the intake passage and using the output signal of the sensor in a process for calibrating the opening degree of the throttle valve. There is no disclosure or suggestion of the evaluation of oscillations (frequency and/or amplitude) of the signal in order to detect compressor creaking or compressor pumping. Moreover, it is respectfully submitted that *Danno et al.* cannot even give any hint as to these features because *Danno et al.* uses the air flow sensors in the usual way in which the sensor signals show a continuous profile as discussed above.

The defects and deficiencies to the primary reference to *Danno et al.* are nowhere remedied by the secondary references to

Engel et al. and *Fausten et al.* Like *Danno et al.*, *Engel et al.* describes the usual use of an air flow sensor. See e.g. column 3, lines 19-44. *Fausten et al.* likewise describes the usual use of an air flow sensor. See e.g. column 3, lines 54-61 of *Fausten et al.* As neither *Engel et al.* nor *Fausten et al.* have any disclosure or suggestion of the use of oscillating characteristics (frequency and amplitude) to determine whether compressor creaking or compressor pumping is present or not, it is respectfully submitted that none of the cited references, whether alone or in combination, can anticipate or render obvious Applicants' invention as recited in claim 17 as amended or new claim 18. Accordingly, it is respectfully submitted that claim 17 as amended and new claim 18 together with claims 11-16 and new claim 18 which depend directly or indirectly thereon are patentable over the cited references.

In summary, claims 11-17 have been amended, claim 10 has been canceled and new claims 18-19 have been added. The specification and Abstract have also been amended. In view of the foregoing, it is respectfully requested that the claims be allowed and that this application be passed to issue.

Respectfully submitted,
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